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Research Study

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Effect of foot hand massage for reducing pain complaints and level of β -endorphin in post sectio caesarean women

Intan Putri Utami¹, Sri Sumarni², Djamaluddin Ramlan²

¹ Midwifery Student, Master Applied of Health, Semarang Health Polytechnic Semarang City, Central Java, Indonesia

² Midwifery Lecturer, Master Applied of Health, Semarang Health Polytechnic Semarang City, Central Java, Indonesia

*Corresponding Author: Intan Putri Utami

Email id: utamiintanp@gmail.com

ABSTRACT

Pain in post sectio caesarean can cause reducing pain. Mechanical foot hand massage is a suitable technique that can be used to treat pain. This therapy reduces anxiety and relaxes tense muscles by clocking gate control theory. The purpose of this study was to determine the effect of foot hand massage on pain complaints and levels of β -endorphin in postcaesarean mother. The research method is quasi experimental design with pretest-posttest with control group. The number of respondents was 34 respondents of post caesarean mother. The intervention group was administered by foot hand massage and measured levels of the hormone β -endorphin in saliva. On the other hand, the control group was administered by educational postpartum care. The results of further analysis of the decrease in pain scale after being given foot hand massage showed $p = 0.000$, the difference in decreasing the pain scale is 0.000. Levels of β -endorphin after being given foot hand massage shows $p = 0.001$, the difference in level of β -endorphin $p = 0.002$. The study proved that giving foot hand massage effects in decreasing the level of pain and improving the level of β -endorphin hormone for post caesarean mother.

Keywords: foot hand massage, pain scale, β -endorphins, post sectio caesarea

INTRODUCTION

Background

The rapid development of science and technology has brought advances in science in the health sector. This progress provides great benefits for humans, including the management of *sectio caesarea*. World Health Organization (WHO) has claimed the average delivery by *cesarean section* is expected to be only 5%-15%. According to research conducted in 2016, it was stated that the average incidence of *sectio caesarea* in the world ranges around 6% - 27%. Latin America and the Caribbean place the highest ranks

with the 40.5% *sectio caesarea* numbers, followed by North America (32.3%), Oceania (31.1%), Europe (25%), Asia (19.2%), and Africa (7.3%)¹. According to the SDKI, the incidence of *sectio caesarea* in Indonesia in 2017 increased, it is stated 921.00 (year 2012) from 4,039,000 deliveries or around 22.8% to 29%. *Handlers sectio caesarea* has the highest proportion occurred in Bali (32.7%) and lowest in North Maluku (6.3%)².

The maternal mortality rate caused by infection in 2016 was around 11%³, and the incidence of

infection in Central Java caused by infection sectio caesarea is around 3.54%⁴. Mortality in postpartum happens in mothers with delivery *cesarean* compared to normal deliveries⁵. Infection cases after delivery by cesarean section is caused by labor wounds, thrombophlebitis, matrititis and arthritis⁶. Delivery by sectio caesarea can cause different problems in contrary with mothers who give birth normally. The impacts can possibly arise after a cesarean section include spinal pain, pain from stitches and incisions, to nausea and vomiting due to the effects of anesthesia. Rapid action must be considered in performing post sectio caesarea care include incision wound care, fluid administration, catheterization, drug administration and routine care. Non-pharmacological pain management has commonly been used in postmothers is sectio caesarea massage therapy.

Massage therapy treat pain non-pharmacologically. According to Houston and Jesurum in Chanif, it is stated that massage can have a good effect in reducing pain⁷. Lewis also mentioned that massage can control pain. This kind of massage triggers the release of endorphins which can inhibit the process of sending pain signals to the spinal cord nerves. Mechanical foot

and hand massage is a technique help to degrade pain release. This therapy can reduce anxiety and relax tense muscles, so that it can block or reduce pain⁸.

There are several studies on efforts to reduce pain in post-mothers sectio caesarea. Those are included research conducted by Abbaspoor Z et al in 2013 conducted at Mustafa Khomeini Hospital, Elam, Iran, from 80 respondents. The study has result the mother's pain being reduced after being given intervention foot and hand massage. So, in a short summary, foot hand massage can be used as a support in postoperative pain management treatment⁹. The same research conducted by Nuriye Degirmen et.al in 2010 stated that foot hand massage is an effective way as a nursing initiative that can control postoperative pain¹⁰. According to Morvarid Irani et.al in 2015, after cesarean section the mother will feel pain as a side effect of using analgesics. This also can interfere with the mother in caring for and breastfeeding her baby. Foot hand massage can be an alternative and simple in reducing pain after sectio caesarea¹¹. The purpose of this study is to determine the effect of foot hand massage on complaints of pain and levels of β -endorphins in post-mothers section caesarea.

METHODS

This study is a *quasi-experimental design* with *pretest-posttest with control group*. This research is conducted at Ungaran Hospital on March 17th-April 23rd, 2021. The number of mother who get involved in the study are 34 respondents. The participants are divided into an intervention and control group, 17 each. In the intervention group, measurement of pain scale uses Numerical Rating Scale (NRS) and 1 cc of saliva sampling is done before and after being given foot hand massage. The intervention is carried out

around 10.00 AM, namely at 22-23 hours after SC. In the control group, a pre-test is carried out, then treatment is carried out according to hospital care standards and education is carried out and then continued with a post-test. Analysis of the data used to assess differences in pain levels and levels of the hormone β -endorphin uses the *Wilcoxon* test. The test *Mann Whitney* is used to assess differences. This study gained ethical clearance from Universitas Sultan Agung Semarang No. 42/II/2021/Komisi Bioetik at February 22th 2021.

RESULTS

Based on table 1, it shows that some of the data have normal distribution values (p value > 0.05) and some are not normally distributed (p value < 0.05).

Table 1: Data Normality Test

Variable	Pvalue	Description
Pre-test pain intervention	0.004	Abnormal
Post-test pain intervention	0.010	Abnormal
Pre-test pain control	0.021	Abnormal
Post-test pain control	0.125	Normal
Pre-test β -endorphin intervention	0.181	Normal
Post-test β -endorphin intervention	0.007	Abnormal

Pre-test β -endorphin control	0.001	Abnormal
Post-test β -endorphin control	0.094	Normal

Table 2: Characteristics of respondents and homogeneity test based on nutritional status and age

Variable	Intervention Group			Control Group			p-value
	F	%	Mean $\pm$ SD	F	%	Mean $\pm$ SD	
Age	-	-	24.6 $\pm$ 2.6	-	-	24.5 $\pm$ 2.8	0.688
BMI							
Normal Nutrition	0	0		1	5.9%		
Overweight	7	41.2%	2.58 $\pm$ 0.5	3	17.6%	2.70 $\pm$ 2.6	0.704
Obesity	11	58.8%		13	76.5%		

Based on table 2 shows that the intervention and control groups have various homogeneous age ($p = 0.688$), it is known that the average age of respondents in the intervention group is 24.6 with a standard deviation of 2.6 while the average age in the control group is 24.5 with a standard deviation of 2.8. The results shows that the average age is greatest in the intervention group of 24.6 years.

The intervention and control groups have homogeneous BMI variants ($p=0.704$). The BMI of respondents in this study is divided into 3 categories, namely normal nutrition, overweight, and obesity. Most of the respondents have obesity BMI as many as 11 respondents (58.8%) in the intervention group and 13 respondents (76.5%) in the control group.

Table 3: The level of pre and post pain scales in the intervention group and control group

Pain scale measurement	Group				<i>P-value</i> ^{<i>b</i>}
	Intervention		Control		
	Mean ±SD	Min-Max	Mean ±SD	Min-Max	
Pre	5.117±1.116	4-7	5.411±1.277	4-8	0.529
Post	3.058±1.434	1-6	5.235±1.393	3-8	0.000
<i>P-value</i> ^{<i>a</i>}	0.000		0.083		
Difference	2.058±0.826		0.176±0.392		0.000

Based on table 3, the level of the pain scale before the intervention group shows an average of 5,117. In the control group the pain scale with an average of 5.411 pain scale measurements after the intervention is carried out in the intervention group decreased by an average of 3.058. Then, in control group the pain scale decreases with an average of 5.235. The standard deviation value for decreasing pain scale before and after intervention in the intervention group is 1.116, while the value for standard deviation decreasing pain scale before and after treatment in the control group is 1.277.

In the Wilcoxon test measuring the pain scale before and after in the intervention group, statistically there is an effect on the pain scale after being given foot hand massage with a p value of 0.000. In the control group, the pain scale before and after the measurement has no effect on the pain scale with $p = 0.083$. While the data analysis shows a significant difference in pain scale in the post test and a decrease in pain scale between the intervention and control groups with $p = 0.000$.

Table 4: The level of β -endorphin pre and post in the intervention group and control group

measurement <i>β</i> -endorphin	Kelompok				^b <i>P</i> -value
	Intervention		Control		
	Mean ±SD	Min-Max	Mean ±SD	Min-Max	
Pre	46.67±24,14	14.10-87.30	46.16±29.30	17.8-128.8	0.770
Post	88.41±67,46	17.9-292.7	47.60±25.78	17-99	0.042
^a <i>P</i> -value	0.001		0.653		

Difference	41.73±60.55	1.43±24.71	0.002
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Based on table 4, The level of β -endorphin before the intervention group has a mean 6.67 ng/ml, whereas the control group has a mean of 46.16 ng/dl. Measurement of levels β -endorphin in the intervention group after his average is 88.41 ng/dl, whereas the control group has a mean of 47.60 ng/dl. Data analysis shows the results of significant differences in levels β -endorphin in the post test and an increase in levels β -endorphin in the intervention and control groups with $p < 0.05$.

In the statistical test by using the Wilcoxon in Table 4.5 shows that changes in the levels of β -

endorphin in the intervention and control groups. It can be shortly concluded that the intervention group with the provision of *foot hand massage* for 20 minutes on the first day of post *sectioaesareacan* increase the levels of β -endorphin as much as 41 ,73 ng/dl.

Statistically, it defines the effect of *foot hand massage* against levels β -endorphin in the mother post *sectioaesarea* with $p=0.001$. Whereas, the control group has no effect on levels, β -endorphin with $p = 0.653$.

DISCUSSION

Effect of foot hand massage on pain complaints

Each individual have a different level of pain. The pain is a subjective thing¹². The response of each individual to the perceived pain perception is also different. The scale of pain felt by each person will totally be different. It appears by the ability of the individual's attitude to respond and perceive the pain.

Based on the results of the study, it is found that after the intervention, the pain scale felt by respondents is in the range of 1 (mild pain) and 6 (moderate pain). Action *sectioaesareacan* cause pain due to incisions in the skin. Feelings of anxiety and fear during post *sectioaesareacan* trigger the sympathetic and parasympathetic nervous systems, so that it may further increase the intensity of the pain felt. There is a theory that states that by providing stimulation under the skin tissue with gentle touch and pressure can divert the pain. Pain impulses originate from the release of several pain mediators which causes peripheral sensitization.

The decrease in pain scale in respondents after foot hand massagemostly experiences a decrease in the average pain scale of 2 points. Foot hand massage is an emphasis on specific areas of the feet and hands. This ways make energy get flows through the body softly, so that at the right foot and hand points can overcome the symptoms that occur in these organs.¹³. The benefits of foot hand massage can improve blood circulation throughout the body, help reduce pain and fatigue and stimulate the production of the hormone β -endorphin which functions to relax the body¹⁴.

Pain receptors can respond due to stimulation and stimulation. The stimulation can be chemical, thermal, electrical, or mechanical¹⁵. Stimulation by

chemicals include histamine, asitikolin, bradykinin, and prostaglandin substances. Chemical ways are thought to be able to increase the effects that cause pain and bradykinin. After that, the stimulation received from the receptor is transmitted in the form of pain impulses to the spinal cord by two types of fibers, namely densely myelinated A (delta) fibers and sluggish fibers (C fibers).

Pain impulses transmitted by delta A fibers have inhibitory properties. The transmission aretransferred to C fibers. Afferent fibers enter the spinal column through the dorsal root (dorsal roof) and synapse in the dorsal horn. The dorsal horn consists of several interlocking layers. The second and third layers form the substantia gelatinosa is the main channel for impulses. These pain impulses will cross the spinal cord on interneurons and continue to the main ascending spinal pathway, namely the spinothalamic tract (STT) pathway or the sphinothalamic and spinoreticular tract (STT) pathway which carry information about the nature and location of pain. From the transmission process, there are two pain mechanism pathways, namely the opiate pathway and nonopiate pathway¹⁶.

The opiate is a pathway characterized by the presence of a receptor junction in the brain consisting of a descending spinal pathway from the thalamus. This line passes through the brain and medulla, to the spinal cord dormant horn, which conducts with nociceptor suppressive impulses. Serotonin is a neurotransmitter in suppressive impulses. Suppressive impulses activate more nociceptor stimulation transmitted by A fibers. The nonopiate is a descending pathway. It does not respond to naloxone whose mechanism is less well known¹⁶.

In addition, *Foot hand massage* is able to inhibit pain messages to the central nervous system. Yet,

this way is also able to make the body react to β -endorphin through massage. β -endorphin is a substance naturally produced by the body and has the effect of morphine. β -endorphin is able to provide a comfortable, calming effect and plays a role in regenerating cells to repair damaged body parts. This decreasing in pain scale is also caused by massage. The touch causes the release of certain neurotransmitters such as dopamine and serotonin so that the relaxation effect is felt by respondents¹⁷.

According to Stillwell SB, he mentions that *foot hand massage* is a form of massage on the hands and feet based on pain in specific areas of the feet or hands related to body parts or disorders. Still on this study, it states *hand foot massage* can accelerate blood circulation and stimulate the relaxation effect on hormone spending β -endorphin to reduce the pain. As result, the patient can be more active in doing the activity, aearly mobilization¹³. This is in accordance with research which states that foot hand massage given for 20 minutes can reduce pain intensity in clients with myocardial infarction¹⁸. Due to the previous research by Chanif (2012) which explains surgical pain is caused by tissue damage. It induces the release of chemical mediators from surgical wounds. Massage then stimulates large nerve fibers and the lining of the dermatome which contains tactile and pressure receptors⁷.

Effect of hand foot massage on levels of β -endorphin

The increase or decrease in hormone levels is β -endorphin is influenced by various factors. It can be caused by physiological responses, stressors, feelings experienced by the individual¹⁹. β -endorphins can be triggered by pain. Also, this case can suddenly arise when the body's response is experiencing pain then it stimulates to the brain to affect the production of endorphins which is sent to the pain point. Increased levels of β -endorphins in the blood is associated with a decrease in the scale of a person's energy expenditure²⁰.

β -endorphin is a neuropeptide consisting of 31 amino acids, produced by the pituitary gland. This case is produced when the body is relaxed. β -endorphins are produced and stored in the anterior pituitary via the proopiomelanocortin precursor (POMC) and transported through the *Liquor*

Cerebrol Spinal (LCS) and circulated in the blood vessels to target organs. POMC is a large protein that splits into smaller proteins called β -endorphins. In the peripheral nervous system - endorphins produce analgesics by binding to opioid receptors. This Causes an interaction that inhibits the release of binding tachykinins, specifically substance peptides, which are key proteins involved in pain transmission^{21,22}.

β -endorphins are released by the pituitary gland in response to stress or pain²³. The way that has an effect on stimulating the process of releasing the hormone β -endorphin is by giving a stretching effect to tense muscles, such as applying foot hand massage to produce a relaxed feeling²⁴. β -endorphin is a hormone of happiness, this hormone is able to provide a comfortable, happy feeling and can increase the body's immunity. At the end, it will be easier to control the body's system from various things, such as pain, anger and make the body think more positively^{25,26}.

Foot hand massage is a pain reduction alternative way. It can possibly make the mother feel more relaxed and comfortable by reducing the adrenaline hormone in the body and calming sensory stimulation. This method can expand the release of -endorphins which can inhibit pain and anxiety stimuli which are transmitted to the brain²⁴. When the mother is relaxed, the body will produce the hormone β -endorphin which will suppress the stressor hormone, as result, the pain felt by the mother can be reduced.

CONCLUSION

Due to the research, it is proved that foot hand massage reduces pain scale and increases levels of hormone β -endorphin mother post sectio caesarean after a given intervention for 20 minutes.

Conflict of Interest

As a piece of appreciation, I am being so grateful, a lot of special thanks to all subjects and family, our midwifery teams, our lovely doctor's colleagues, our nurse friend's, and all people who help to complete the study. The authors declare no conflict of interest during conducting this study.

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